DETAILED ACTION

Response to Amendment

1. Amendment to the claims received 3/22/2010 has been entered. Claim 1 has been amended.

Response to Arguments

2. Applicant's arguments and declaration filed 3/22/2010, with respect to the rejection(s) of claim(s) 1 and 10 under 103(a) have been fully considered and are persuasive. The arguments located on Pg. 6 were presented previously in the interview conducted 3/15/2010 where applicant provided evidence by means of the specification of US 4,790,802 supporting a typo in Fig. 7, wherein the x-axis cites "Angle of final twist α (°)" and wherein the specification discloses an angle of final twist γ and an angle of first twist α and wherein the specification supports that the x-axis should instead be "Angle of first twist α (°)" thereby no longer providing sufficient support for the disclosure of a core cord twist angle between 15° and 2°. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Nakajima et al. (JP 5-312237) and Umezawa (US 5,520,233).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 2-12, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto (JP 56-159143 A) in view of Fujita (US 6,216,853) and Kimura (JP 10-184808 A) and Ueda et al. ("Noise and Life of Helical Timing Belt Drives") and Nakajima et al. (JP 5-312237).

As per claim 2-3 and 10-11, Sakamoto discloses a belt comprising:

a back layer (Fig. 5);

teeth (8) configured to be engaged with a pulley; and

core cords (3) embedded between the back layer and the teeth and aligned in the longitudinal direction of the belt for reinforcing the belt (Fig. 5), and no canvas is formed on the helical teeth nor on a surface between the helical teeth (Fig. 5), wherein the belt is created by wrapping the core cords (3) around and in contact with a cylindrical mold (2) having female helical teeth (1) and injecting a raw material (5) into a cavity between the cylindrical mold and an outer cylinder mold (4) enclosing the cylindrical mold (Fig. 2).

Sakamoto discloses the belt being formed of a belt molding raw material (abstract) but is silent as to what material is used.

Fujita discloses a toothed belt (1) having a body (1A) and teeth (2) being made from urethane resin (Col. 4, Ln. 17-24).

It would have been obvious to one having ordinary skill in the art at the time the invention to modify the belt of Sakamoto to make the back layer and teeth of the belt made of urethane resin, as taught by Fujita, for increasing thermal and strength properties. Also note In re Leshin, 125 USPQ 416, and that it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Sakamoto fails to explicitly disclose the teeth being helical and substantially all of the core cords are twisted at an angle opposing to an angle of helical teeth.

Kimura discloses a belt (1) having helical teeth with a helical tooth angle formed by a tooth inclination line of each helical tooth and a line perpendicular to a longitudinal direction of the belt (α) and core cords (2), and wherein all of the core cords are twisted in a single direction at a twist angle which is formed by a twist inclination line of each core cord and a line parallel to a longitudinal direction of the core cords (β),

wherein a direction of the tooth inclination line and a direction of the twist inclination line are opposite to each other with respect to the line perpendicular to the longitudinal direction of the belt, at (Fig. 2, core cords are twisted using an S-twist or Z-twist such that all wires are twisted in the same direction, and wherein the angle of twist of the core cords is opposing an angle of inclination 10a of the helical teeth).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Sakamoto to include helical teeth and the core cords

being twisted at an angle opposite the angle of the helical teeth, as taught by Kimura, for the purpose of reducing noise and vibrations.

Modified Sakamoto fails to explicitly disclose a helical tooth angle set between 5° and 15° (claim 2 and 10) or more specifically, a tooth angle of 10°, 7°, or 5° (claim 3 and 11) wherein the helical tooth angle is an angle formed by a tooth inclination line of each helical tooth and a line perpendicular to a longitudinal direction of the belt.

Ueda et al. discloses a helical synchronous belt having core cords (Pg. 274, "2. Forms and Dimensions of Test Belts and Pulleys", Ln. 4-5) and a helical tooth angle set to 3, 5 or 10° (Pg. 274, "2. Forms and Dimensions of Test Belts and Pulleys", Ln. 5-8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Modified Sakamoto to include the helical tooth angle set between 5° or 10°, as taught by Ueda et al. for the purpose of reducing noise.

Modified Sakamoto fails to explicitly disclose a core cord twist angle set to 15° to 2° (Claim 2 and 10), or more specifically 10.2° or 4.8°(claim 3 and 11).

Nakajima discloses a belt for power transmission wherein the belt comprises a plurality of reinforcement cords (3) and wherein said cords are obtained by twisting a plurality of filaments about an axis (12) parallel to the length direction of the cord (Fig. 3) and wherein an angle of twist between the axis (12) and the twisted filament (11) is between 15-25 degrees (abstract)

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Modified Sakamoto to include a core cord twist angle set between 15° to 2°, as taught by Nakajima for the purpose of providing a balance

between strength and flexibility of the belt. Modified Sakamoto fails to explicitly disclose the core cord twist angle being 10.2° or 4.8°, however it would have been obvious to optimize the angle of the core cord twist angle since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

As per claims 4, 6 and 12, Ueda et al. further discloses the core cords being made of glass fiber (Pg. 274, "2. Forms and Dimensions of Test Belts and Pulleys", Ln. 4-5).

As per claims 5 and 7, Ueda et al. also discloses the use of the helical synchronous belt in a driving carriage (Pg. 274, "1. Introduction", Ln. 1-3).

As per claims 8 and 9, Ueda et al. also discloses the use of the helical synchronous belt in a driving carriage (Pg. 274, "1. Introduction", Ln. 1-3).

As per claims 17-18, Modified Sakamoto discloses the belt being adapted to move back and forth a carriage of a printer or copier (capable for the use of providing motion to a carriage of a printer or copier).

6. Claims 2-12, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto (JP 56-159143 A) in view of Fujita (US 6,216,853) and Kimura (JP 10-184808 A) and Ueda et al. ("Noise and Life of Helical Timing Belt Drives") and Umezawa (US 5,520,233).

As per claim 2-3 and 10-11, Sakamoto discloses a belt comprising:

a back layer (Fig. 5);

teeth (8) configured to be engaged with a pulley; and

core cords (3) embedded between the back layer and the teeth and aligned in the longitudinal direction of the belt for reinforcing the belt (Fig. 5), and no canvas is formed on the helical teeth nor on a surface between the helical teeth (Fig. 5), wherein the belt is created by wrapping the core cords (3) around and in contact with a cylindrical mold (2) having female helical teeth (1) and injecting a raw material (5) into a cavity between the cylindrical mold and an outer cylinder mold (4) enclosing the cylindrical mold (Fig. 2).

Sakamoto discloses the belt being formed of a belt molding raw material (abstract) but is silent as to what material is used.

Fujita discloses a toothed belt (1) having a body (1A) and teeth (2) being made from urethane resin (Col. 4, Ln. 17-24).

It would have been obvious to one having ordinary skill in the art at the time the invention to modify the belt of Sakamoto to make the back layer and teeth of the belt made of urethane resin, as taught by Fujita, for increasing thermal and strength properties. Also note In re Leshin, 125 USPQ 416, and that it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

Sakamoto fails to explicitly disclose the teeth being helical and substantially all of the core cords are twisted at an angle opposing to an angle of helical teeth.

Kimura discloses a belt (1) having helical teeth with a helical tooth angle formed by a tooth inclination line of each helical tooth and a line perpendicular to a longitudinal direction of the belt (α) and core cords (2), and wherein all of the core cords are twisted

in a single direction at a twist angle which is formed by a twist inclination line of each core cord and a line parallel to a longitudinal direction of the core cords (β),

wherein a direction of the tooth inclination line and a direction of the twist inclination line are opposite to each other with respect to the line perpendicular to the longitudinal direction of the belt, at (Fig. 2, core cords are twisted using an S-twist or Z-twist such that all wires are twisted in the same direction, and wherein the angle of twist of the core cords is opposing an angle of inclination 10a of the helical teeth).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Sakamoto to include helical teeth and the core cords being twisted at an angle opposite the angle of the helical teeth, as taught by Kimura, for the purpose of reducing noise and vibrations.

Modified Sakamoto fails to explicitly disclose a helical tooth angle set between 5° and 15° (claim 2 and 10) or more specifically, a tooth angle of 10°, 7°, or 5° (claim 3 and 11) wherein the helical tooth angle is an angle formed by a tooth inclination line of each helical tooth and a line perpendicular to a longitudinal direction of the belt.

Ueda et al. discloses a helical synchronous belt having core cords (Pg. 274, "2. Forms and Dimensions of Test Belts and Pulleys", Ln. 4-5) and a helical tooth angle set to 3, 5 or 10° (Pg. 274, "2. Forms and Dimensions of Test Belts and Pulleys", Ln. 5-8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Modified Sakamoto to include the helical tooth angle set between 5° or 10°, as taught by Ueda et al. for the purpose of reducing noise.

Modified Sakamoto fails to explicitly disclose a core cord twist angle set to 15° to 2° (Claim 2 and 10), or more specifically 10.2° or 4.8°(claim 3 and 11).

Umezawa discloses a tire having a plurality of reinforcement cords and wherein the tensile rigidity of the belt can be improved by changing the twisting angle of the filament in the cord (Col. 7, Ln. 46-54) and wherein conventionally angles of 8-10 degrees are used (Col. 6, Ln. 18-25) and wherein the twisting angle can be reduced by lengthening the twisting pitch whereby the tensile modulus of the cord is raised to improve the tensile rigidity of the belt and having a twisting angle of 3 to 6 degrees (Col. 7, Ln. 65-Col. 8, Ln. 8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Modified Sakamoto to include a core cord twist angle set between 15° to 2°, as taught by Umezawa for the purpose of providing a balance between strength and flexibility of the belt. Modified Sakamoto fails to explicitly disclose the core cord twist angle being 10.2° or 4.8°, however it would have been obvious to optimize the angle of the core cord twist angle since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

As per claims 4, 6 and 12, Ueda et al. further discloses the core cords being made of glass fiber (Pg. 274, "2. Forms and Dimensions of Test Belts and Pulleys", Ln. 4-5).

As per claims 5 and 7, Ueda et al. also discloses the use of the helical synchronous belt in a driving carriage (Pg. 274, "1. Introduction", Ln. 1-3).

As per claims 8 and 9, Ueda et al. also discloses the use of the helical synchronous belt in a driving carriage (Pg. 274, "1. Introduction", Ln. 1-3).

As per claims 17-18, Modified Sakamoto discloses the belt being adapted to move back and forth a carriage of a printer or copier (capable for the use of providing motion to a carriage of a printer or copier).

7. Claims 2-12, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto (JP 56-159143 A) in view of Fujita (US 6,216,853) and Kimura (JP 10-184808 A) and Ueda et al. ("Noise and Life of Helical Timing Belt Drives") and Umezawa (US 5,520,233) and further in view of Onoe et al. (US 4,790,802).

As per claims 14-16, Modified Sakamoto fails to explicitly disclose the core cords being made with aramid fibers.

Onoe et al. discloses a belt (1) having reinforcement cords (6) having and angle of twist and wherein the reinforcement cords may be made from aramid fibers (Col. 3, Ln. 52-54).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Modified Sakamoto to make the core cords out of aramid fibers, as taught by Onoe et al., for the purpose of providing a balance between strength, flexibility and weight. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

8. Claims 2-12, and 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakamoto (JP 56-159143 A) in view of Fujita (US 6,216,853) and Kimura (JP 10-184808 A) and Ueda et al. ("Noise and Life of Helical Timing Belt Drives") and Nakajima et al. (JP 5-312237) and further in view of Onoe et al. (US 4,790,802).

As per claims 14-16, Modified Sakamoto fails to explicitly disclose the core cords being made with aramid fibers.

Onoe et al. discloses a belt (1) having reinforcement cords (6) having and angle of twist and wherein the reinforcement cords may be made from aramid fibers (Col. 3, Ln. 52-54).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the belt of Modified Sakamoto to make the core cords out of aramid fibers, as taught by Onoe et al., for the purpose of providing a balance between strength, flexibility and weight. Further, it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. In re Leshin, 125 USPQ 416.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANNA MOMPER whose telephone number is (571)270-5788. The examiner can normally be reached on M-F 6:00-3:30 (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Siconolfi can be reached on (571) 272-7124. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

am

/Robert A. Siconolfi/
Supervisory Patent Examiner, Art Unit 3657